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# PATENT APPLICATION TRANSMITTAL LETTER

Docket Number (Optional)

To the Commissioner of Patents and Trademarks:

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 CFR 1.53(b)(1) is the patent application of William P. Newton, Robert M. Lucci, and Thomas F. Batten

entitled SUPPORT SYSTEM FOR Laterally Removable SASH

Enclosed are:

- ☒ 20 pages of written description, claims and abstract.
- ☒ 8 sheets of drawings.
- ☒ an assignment of the invention to Caldwell Manufacturing Company
- ☒ executed declaration of the inventors.
- ☐ a certified copy of a \_\_\_\_\_ application.
- ☒ ~~assignment~~ power of attorney. and Certificate Under 37 CFR 3.73(b)
- ☐ a verified statement to establish small entity status under 37 CFR 1.9 and 1.27.
- ☐ Information disclosure statement
- ☐ preliminary amendment
- ☐ other: \_\_\_\_\_

## CLAIMS AS FILED

	NUMBER FILED	NUMBER EXTRA	RATE	FEE
BASIC FEE (37 CFR 1.16(a))			\$770	\$ 770
TOTAL CLAIMS (37 CFR 1.16(c))	90 - 20 =	* 70	x \$22	1540
INDEPENDENT CLAIMS (37 CFR 1.16(b))	11 - 3 =	* 8	x \$80	640
MULTIPLE DEPENDENT CLAIM PRESENT	(37 CFR 1.16(d))		\$	
* NUMBER EXTRA MUST BE ZERO OR LARGER		TOTAL		\$ 2950
If applicant has small entity status under 37 CFR 1.9 and 1.27, then divide total fee by 2, and enter amount here.		SMALL ENTITY TOTAL		\$

- ☒ A check in the amount of \$ 2950.00 to cover the filing fee is enclosed.
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**SUPPORT SYSTEM FOR LATERALLY REMOVABLE SASH**

**Technical Field**

Support and counterbalancing of heavy sash that are laterally removable from between opposed jambs of a window.

**5 Background**

This invention improves upon a solution proposed in U.S. Patent No. 5,231,795 for supporting and counterbalancing a heavy sash that is laterally removable from between opposed jambs of a window. The sash counterbalancing and removal problem is the same one addressed in the '795 patent, but the new solution of this invention offers improved performance.

Large and heavy window sash, such as used in schools, offices, and institutional buildings, move vertically between opposed pairs of jambs that are generally extruded of metal. A sash for such a window can weigh over 100 pounds so that a counterbalance system for shoes supporting such a sash must exert a corresponding upward lift. Locking the support shoes of the counterbalance system within the jambs must be secure and reliable, because of the large spring forces involved. Also, the sash support must make a heavy sash easy to raise and lower, and removal and replacement of a sash must be convenient and reliable. Since such windows are often used in schools, the counterbalance support system must also be tamper resistant to the manipulations of curious children. Besides these requirements, an effective window system must accomplish all the necessary functions in a reliable way with elements that are inexpensive to manufacture and maintain.

**Summary of the Invention**

Our support system for a sash that is laterally removable from between opposed window jambs uses sash support arms that are

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movably arranged for transferring the weight of the sash to the shoes and for bridging distances between the sash stiles and the shoes. When not supporting the weight of the sash, the support arms move to positions that allow the sash to be lifted off of

5 counterbalance support shoes and laterally removed from between the window jambs and conversely reinserted between window jambs and lowered onto the shoes. This is done while the shoes are locked in positions within the window jambs. When the support arms support the weight of the sash, they are in positions that rest the  
10 sash weight on the counterbalance shoes to support the weight of the sash.

The counterbalance shoes, which are biased upwardly by counterbalance springs, cooperate with the sash support arms. The shoes receive and support the sash weight transferred to the shoes  
15 by the sash support arms, and the shoes have hooks that can be deployed to lock the shoes reliably in the jambs by engaging projections formed in the jambs for this purpose. The hooks are latched in undeployed positions and can be unlatched to engage the jambs' projections and lock the shoes against upward movement.

20 Several components of the inventive sash support system are preferably formed of metal extrusions. These include the shoes, the sash support arms, and the locking hooks for the shoes. Extrusions for these elements are formed in predetermined cross-sectional configurations and are cut to suitable widths to perform the  
25 necessary cooperative functions.

Forming sash support elements of extruded metal lowers the cost of the system while also providing the strength necessary for supporting a heavy sash. Extruded metal elements also accommodate the configurations necessary for the interactions between the shoes  
30 and the sash support arms. Altogether, the improvements of this invention allow easier raising and lowering of the sash, more convenient sash removal and replacement, and a more convenient way of locking the shoes in place. They also allow all this to be accomplished with a system that is less costly to manufacture and  
35 maintain.

## Drawings

Figures 1-3 schematically illustrate the removal and replacement of a sash supported by the inventive system with the sash moved laterally for removal or insertion in FIG. 1, lifted above  
5 or lowered onto counterbalance shoes in FIG. 2, and supported on counterbalance shoes in FIG. 3.

Figures 4 and 5 are partially cut-away elevational views showing preferred embodiments of sash support arms and counterbalance shoes, with a shoe locked in a jamb in FIG. 4 and  
10 unlocked from a jamb in FIG. 5.

Figure 6 is an exploded isometric rear corner view of the shoe of FIGS. 4 and 5.

Figure 7 is an isometric rear corner view of the shoe of FIG. 6 shown in assembled condition.

15 Figure 8 is an isometric front corner view of the shoe of FIGS. 6 and 7.

Figures 9 and 10 are partially cut-away views of a sash support arm shown in an outwardly extending position in FIG. 9 and in a downwardly dependent position in FIG. 10.

20 Figures 11 and 12 are isometric views respectively from above and below guide blocks for the shoes of FIGS. 6-8.

## Detailed Description

A sash supported according to this invention is laterally removable from between a pair of opposed window jambs in a way  
25 that is similar to the sash removal shown in U.S. Patent No. 5,231,795. Otherwise, the improved sash support system, including sash support arms, sash shoes, and shoe-locking hooks, differs significantly from the '795 patent.

The basic operation of a preferred embodiment of the inventive  
30 system is shown schematically in FIGS. 1-3. Sash 10, as shown in

FIG. 1, is lifted off of shoes 30 that are locked in place within jambs 11, which are illustrated by broken lines extending along the light opening between jambs 11. For heavy sash that benefit from the inventive support system, jambs 11 are generally extruded of metal to allow lateral room for maneuvering sash 10 in between and out from between jambs 11. Jambs 11 are essentially the same as jambs used with the sash support system of the '795 patent, and such jambs are available in different dimensions to accommodate different sizes of sash 10 and corresponding counterbalance systems. Sash 10, in the position shown in FIG. 1, is also moved laterally within jambs 11 to free one stile edge of sash 10 from jambs 11 for maneuvering sash 10 out from between jambs 11 or back into a position between jambs 11.

In the position shown in FIG. 2, sash 10 is centered between jambs 11 but elevated above locked shoes 30, as it is lifted off from or lowered onto shoes 30. In the position shown in FIG. 3, sash 10 is again centered between jambs 11, but is lowered onto shoes 30, which are no longer locked within jambs 11. In the supported position shown in FIG. 3, sash 10 rests on and is supported by shoes 30 by means of sash support arms 20 that are moved to an outward position. Arms 20 are in inward positions when sash 10 is lifted off of shoes 30, as shown in FIGS. 1 and 2.

Besides the preferred pivoting of sash support arms 20 on the stiles of sash 10, as illustrated in FIGS. 1-3, it is also possible to arrange sash support arms that are pivotally mounted on shoes 30. With such an arrangement, shoe mounted sash support arms would pivot inward to engage sash stiles and support the weight of a sash engaged by the arms, which are preferably braced against pivoting when in a support position. Pivoting the support arms on the shoes can thus achieve a similar result to the preferred pivoting of the support arms on the sash stiles. Either way, the support arms transfer the sash weight to the shoes and move from sash support positions when the sash is uplifted from the shoes, to allow lateral movement and withdrawal of the sash from the jambs.

More details of a preferred embodiment of a sash support system are illustrated in FIGS. 4-12. The preferred system elements include sash support arms, counterbalance shoes, and shoe-locking hooks.

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### Sash Support Arms

A support arm 20 is preferably pivotally mounted on each opposite stile of sash 10. Mounts for support arms 20 are preferably near lower corners of sash stiles, but more elevated mounts are also possible. As best shown in FIGS. 4, 5, 9, and 10, support arms 20 are  
 10 pivotally mounted on brackets 21 of mounts 22 that are secured to the stiles of sash 10, which have a recessed edge groove that receives mount brackets 22. Pivot pins 23 support arms 20 on brackets 21 to pivot between outwardly extending positions shown in FIGS. 4, 5, and 9 and downwardly dependent positions shown in  
 15 FIGS. 1, 2, and 10.

Each of these positions is limited and braced by mount block 22. In the outwardly extending position, an end 24 of arm 20 abuts against mount 22 to brace arm 20 against pivoting upward. In the downwardly dependent position, an abutment 25 on support arm 20  
 20 engages a lance 26 on mount block 22 to prevent pivoting of support arm 20 downward or inward beyond the position shown in FIG. 10.

An outer end 27 of support arm 20 engages a sash shoe, as explained in more detail below. Support arms 20 having different lengths from pivot pin 23 to arm end 27 are desirable to  
 25 accommodate different dimensions of window systems. Support arms 20 are also preferably formed of extruded metal, which helps make different lengths of support arms 20 inexpensive. To distinguish between support arms 20 of different lengths, the arms are preferably formed with extruded coding lines 28. For example,  
 30 three coding lines 28 are illustrated in FIGS. 4 and 5 to indicate long support arms 20, and two coding lines 28 are illustrated in FIGS. 9 and 10 to indicate medium length support arms 20. Not only can different numbers of coding lines 28 be used, but these can also be positioned in different places on an extrusion from which support  
 35 arms 20 are cut. Extrusion fabrication also allows support arms 20

to be cut to different widths, if necessary, to accommodate different window dimensions and sash weights.

### Counterbalance Shoes

Counterbalance shoes 30 are also preferably formed of metal extrusions. Shoes 30 can then be cut to the desired shoe width from a length of extruded material having the necessary cross-sectional configuration to provide the required shoe functions.

An upper region 31 of shoe 30 preferably has a hook shape in which slots 32 are cut, as shown in FIGS. 6-8, to interconnect with the lower ends of counterbalance elements that are not shown. Shoes 30 can accommodate different numbers of counterbalance elements received in correspondingly different numbers of slots 32, especially when shoes are cut to different widths. This readily adapts a single extrusion for shoes 30 to accommodate different window dimensions and sash weights.

Preferably a mid-region 34 of shoe 30 has a groove 33 that receives and holds a guide block 35. Groove 33 and guide block 35 are shaped so that block 35 can be slid endwise into groove 33 where it is frictionally held in place. Block 35 is preferably molded of resin material and configured to bear against a rear wall 12 of jamb 11 and against fins 13 that extend inward in jamb 11. Guide block 35 gives shoe 30 a smooth running fit within a channel 14 formed behind fins 13 in a rear region of jamb 11 spaced outward from sash 10. Channel 14 then serves as a vertical run for block 35 which in turn guides shoe 30 vertically within jamb 11, while holding shoe 30 away from any metal-to-metal contact with jamb 11. Guide block 35 can have many configurations that perform the necessary guiding function, which includes both vertical guidance and resistance to torsion applied to shoe 30 by counterbalance elements to which it is connected.

A lower region 36 of shoe 30 has a sash support platform 37 that is engaged by the ends 27 of sash support arms 20 to uphold the weight of sash 10. Platforms 37 extend toward sash 10 far enough to engage sash support arms 20 in their inward positions illustrated

in FIG. 10. The extension of platforms 37 towards sash 10 also leaves free room above platforms 37 for sash 10 to be moved laterally while it is raised above platforms 37 and maneuvered out of or into the space between opposed jambs 11.

- 5 As a sash 10 is lowered into a supported position on shoes 30, the ends 27 of support arms 20 first engage inner end regions 38 of support platforms 37; and then as sash 10 is further lowered, arm ends 27 slide outward along platforms 37 to the support position illustrated in FIGS. 4 and 5. The reverse occurs as sash 10 is lifted up off of shoes 30.

- 15 The small step 39 in platform 37 is preferred for resisting lateral movement of sash 10 while resting on shoes 30 and as a positive indication that arm ends 27 of a sash being lowered have reached appropriately supported positions on platforms 37. The regions where arm ends 27 support sash 10 on platforms 37 are preferably directly below slots 32 where counterbalance elements exert an upward force on upper regions 31 of shoes 30. This minimizes any moment arms tending to turn shoes 30 around horizontal axes.

## 20 **Shoe-locking Hooks**

- Below platform 37 is preferably arranged a groove 44 that receives a pivot pin 43 for a shoe-locking hook 45. Pin 43 can be pressed axially into groove 44 and through hook 45 to leave hook 45 pivotally hanging below platform 37, as illustrated in FIGS. 4, 7, and 25 8. The center of gravity of hook 45 is arranged toward the sash side of pivot pin 43 so that the end 46 of hook 45 bears against the rear wall 12 of jamb 11. There, hook end 46 interlocks with a projection or lance 47 formed in jamb wall 12, as illustrated in FIG. 4.

- 30 The underside of the inward region 38 of support platform 37 preferably has a groove 41 that receives and retains a resilient latch spring 40. An anchored end 51 of spring 40 can be pressed into slot 41 to retain spring 40 frictionally in place. A downwardly extending projection 52 engages spring 40 to prevent movement beyond a resilient latching position, as illustrated.



Hook 45 has a latching nose 48 that latches into an opening 42 in spring 40, as illustrated in FIG. 5. Latching nose 48 and spring 40 are preferably configured so that shoe-locking hook 45 can be manually pushed into the latched position shown in FIG. 5.

- 5 Unlatching shoe lock 45 for deployment preferably requires pressing a screwdriver blade in between hook end 46 and the free end 49 of spring 40. This makes the accidental deployment of shoe locks 45 unlikely.

- 10 Shoe lock 45 is also preferably cut from an indefinite length of a metal extrusion. This can give hook 45 the necessary strength to resist the counterbalance bias, while also keeping hook 45 inexpensive. Although lances 47 are preferred for their simplicity and effectiveness in interacting with locks 45, other projections or interlock discontinuities in jamb 11 are also possible.

- 15 When the elements of the inventive sash support system are assembled and operated, as shown schematically in FIGS. 1-3, they meet all the objectives of the invention. They reduce the cost of a sash support system while improving its convenience, effectiveness, and reliability. They also allow a window sash to be easily raised or  
20 lowered by a person who may weigh less than the sash.

**We Claim:**

1. A support system for a sash that is laterally removable from between opposed window jambs, the support system comprising:

- 5       a. a pair of sash support arms pivotally mounted respectively on opposite stiles of the sash;
- b. the support arms being mounted to pivot between inwardly dependent and outwardly extended positions;
- c. the sash support arms in the inwardly dependent  
10       positions being disposed for engaging sash shoes as a sash is lowered into a supported position between a pair of counterbalanced shoes locked in the jambs; and
- d. the outwardly extending positions of the sash support  
15       arms being braced so that outer end regions of the sash support arms rest on the shoes to support the weight of the sash.

2. The system of claim 1 wherein the shoes include platforms extending toward the sash stiles so that inner regions of the platforms engage the sash support arms in the inwardly  
20       dependent positions and so that outer regions of the platforms engage the outer end regions of the sash support arms in the outwardly extending positions.

3. The system of claim 2 wherein counterbalance lifts are applied to the shoes in regions above the outer platform regions  
25       where the outer end regions of the sash support arms rest.

4. The system of claim 1 wherein the shoes include locking elements deployable to lock the shoes within the jambs during removal and replacement of the sash.

5. The system of claim 4 wherein the locking elements are  
30       pivotally mounted on the shoes and latched in undeployed positions.

6. The system of claim 4 wherein the locking elements are formed as hooks that are cut from metal extrusions.

7. The system of claim 1 wherein the shoes and the sash support arms are each cut from metal extrusions.

8. The system of claim 7 wherein the shoes are cut to different widths to fit different jamb channels.

5 9. The system of claim 8 wherein the shoes are configured to connect to different numbers of counterbalance elements.

10. The system of claim 7 wherein the sash support arms are extruded in different lengths to fit different jamb dimensions.

10 11. The system of claim 10 wherein the different sash support arms are extruded with code lines indicating size.

12. In a counterbalance system for a window sash supported by a pair of counterbalanced sash shoes so that the sash extends between a pair of jambs from which the sash is removable by maneuvering the sash upward and laterally while the shoes are  
15 locked in the jambs, the improvement comprising:  
a. the shoes being formed of metal extrusions cut to shoe width;  
b. upper regions of the shoe extrusions being interconnected with counterbalance elements; and  
20 c. lower regions of the shoe extrusions supporting the sash.

13. The improvement of claim 12 wherein the sash is supported on the shoes by sash support arms cut from metal extrusions.

25 14. The improvement of claim 13 wherein the sash support arms are movably mounted on the sash to rest on the shoes in outwardly extending positions of the sash support arms.

15. The improvement of claim 13 wherein the sash support arms are mounted on the sash to pivot between outwardly extending positions and inwardly dependent positions.

16. The improvement of claim 12 wherein the shoes include locking elements that engage the jambs to lock the shoes during sash removal and replacement.

17. The improvement of claim 16 wherein the locking  
5 elements are cut from metal extrusions and are pivotally mounted on the shoes.

18. The improvement of claim 16 wherein the shoes have latches that latch the locking elements in undeployed positions.

19. The improvement of claim 12 including mid-regions of  
10 the shoe extrusions having guides that slide in the jambs to guide vertical movement of the shoes.

20. The improvement of claim 19 wherein the shoe extrusions are configured with retaining grooves that receive the guides.

21. The improvement of claim 20 wherein the shoe  
15 extrusions have retaining grooves for receiving hook latches and pin grooves for receiving pins of shoe hooks.

22. The improvement of claim 12 wherein the shoes are cut to different widths to fit different sizes of jamb channels.

23. The improvement of claim 22 wherein shoes of different  
20 widths are configured to interconnect to different numbers of counterbalance elements.

24. The improvement of claim 13 wherein the sash support  
25 arms are extruded in different lengths to accommodate different distances between opposite shoes.

25. The improvement of claim 24 wherein different lengths of sash support arms are extruded with code lines indicating size.

26. A method of removing a window sash from between  
30 opposed window jambs where the sash is supported on a pair of counterbalanced shoes arranged for moving within the jambs, the method comprising:

- a. releasing shoe hooks from latched positions on each of the shoes to deploy the hooks to hang dependently from the shoes;
- b. raising the sash and the shoes so that the hooks move upward from positions below lances in the jambs and engage the lances in the dependent positions of the hooks to lock the shoes against upward movement; and
- c. lifting the sash above the hook-locked shoes and laterally withdrawing the sash from between the jambs.

27. The method of claim 26 including releasing a spring clip for unlatching the shoe hooks.

28. The method of claim 26 wherein releasing the shoe hooks allows the shoe hooks to pivot downward to deployed positions where tips of the hooks engage the jambs.

29. A counterbalance sash shoe comprising:

- a. an extruded metal body cut to shoe width;
- b. an upper region of the extruded body being configured to interconnect with a counterbalance; and
- c. a lower region of the extruded body being configured as a platform to support a sash.

30. The shoe of claim 29 including a locking hook mounted on the shoe for locking the shoe when the hook is deployed.

31. The shoe of claim 30 wherein the hook is formed of a metal extrusion cut to hook width.

32. The shoe of claim 30 including a spring latch for retaining the hook in an undeployed position.

33. The shoe of claim 32 wherein the hook is manually movable to a latched engagement with the spring latch and is unlatched from the spring latch with a tool.

34. The shoe of claim 30 wherein the shoe body is formed with a pin groove for receiving a pin for pivoting the hook and a spring groove for retaining the spring latch.

35. The shoe of claim 29 including a guide mounted on the shoe between the platform and the interconnect region, the guide being formed of resin material.

36. The shoe of claim 35 wherein a mid-region of the shoe body is formed with an interlock for holding the guide.

37. The shoe of claim 29 wherein the shoes are cut to different widths to fit different sizes of jamb channels.

38. The shoe of claim 37 wherein different widths of shoes are configured to connect to different numbers of counterbalance elements.

39. A sash support system comprising:

- a. a plurality of sash support elements cut from metal extrusions having different cross-sectional shapes;
- b. a first one of the extruded elements being configured as a shoe having an upper region engaging a counterbalance and a lower region supporting a sash; and
- c. a second one of the extruded elements being configured as a sash support arm connected to a stile of the sash to engage the sash support region of the shoe.

40. The system of claim 39 including a third one of the extruded elements being configured as a shoe lock connectable to a lower region of the shoe to be movable between deployed and undeployed positions.

41. The system of claim 40 wherein the shoe is configured with a pin groove for receiving a pivot pin supporting the shoe lock.

42. The system of claim 40 including a resilient latch for retaining the shoe lock in the undeployed position.

43. The system of claim 42 wherein the hook and the latch are configured so that the hook is manually latchable and is unlatchable with a tool.

44. The system of claim 41 wherein the shoe lock is pivotally movable and is downwardly dependent in the deployed position.

45. The system of claim 39 including a resin guide mounted on the shoe for guiding vertical travel of the shoe.

46. The system of claim 45 wherein a mid-region of the shoe is configured with a locking slot for receiving the resin guide.

47. The system of claim 39 wherein the sash support arm is pivotally mounted on the sash stile to move between downwardly dependent and outwardly extending positions.

48. The system of claim 47 wherein the sash support arm is braced from moving beyond the outwardly extending position.

49. The system of claim 39 wherein the shoe is cut from an extrusion in different widths to accommodate different jamb shoe channels.

50. The system of claim 49 wherein different width shoes are configured for connecting to different numbers of counterbalance elements.

51. The system of claim 39 wherein the sash support arm is selected from a plurality of extrusions of different widths.

52. The system of claim 51 wherein extrusions for different lengths of sash support arms are formed with code lines indicating arm length.

53. A sash support comprising:

- a. sash support arms movably mounted respectively on each stile of the sash;
- b. the support arms being movable between inward and outward positions; and
- c. end regions of the support arms in the outward positions resting on respective sash shoes that are counterbalanced to support the sash.

54. The support of claim 53 wherein the support arms are pivotally mounted on the sash stiles and are limited to movement between the inward and outward positions.

55. The support of claim 53 wherein the support of the sash on the sash arms allows the sash to be lifted and maneuvered laterally for withdrawal from a window.

56. The support of claim 53 wherein counterbalance lift is applied to the shoes above the end regions of the support arms resting on the shoes.

57. The support of claim 53 wherein the support arms are pivotally mounted on brackets that are secured to the sash stiles, and the support arms engage the brackets to limit the movement of the support arms to the inward and outward positions.

58. The support of claim 53 wherein the sash support arms are cut from metal extrusions.

59. The support of claim 58 wherein extrusions for the support arms are formed in different lengths and provided with extruded coding lines indicating support arm length.

60. The support of claim 53 wherein the shoes are cut from metal extrusions.

61. A system for locking counterbalance shoes to window jambs while a sash supported on the shoes is removed from between the window jambs, the locking system comprising:

- a. the shoes having hooks that are pivotally mounted on lower regions of the shoes to move between latched and unlatched positions;
- b. the hooks in unlatched positions being dependent from the shoes to engage the jambs and hook under lances formed in the jambs; and
- c. the hooks in latched positions being retained out of engagement with the jambs.



62. The system of claim 61 wherein resilient latches are carried on the shoes for holding the hooks in latched positions.

63. The system of claim 62 wherein the hooks are manually movable into the latched positions and are released from the latched positions with the aid of a tool.

64. The system of claim 61 wherein the hooks and the shoes are formed of metal extrusions.

65. The system of claim 64 wherein the shoes have extrusion-formed grooves that receive pivot pins for the hooks.

66. The system of claim 65 wherein the shoes have extrusion-formed slots that retain resilient latches for holding the hooks in latched positions.

67. A support system for a sash that is laterally removable from between opposed window jambs and is supported on counterbalanced shoes that run vertically within the jambs and are separated sufficiently to allow lateral movement of the sash, the support system comprising:

- a. the shoes having platforms that extend toward the sash to support the sash;
- b. the sash having a support arm secured to each sash stile and extending outward from the sash to engage the shoe platforms; and
- c. the sash support arms being mounted on the sash to pivot between inwardly dependent positions in which the sash support arms engage sash end regions of the shoe platforms and outwardly extending positions in which the sash support arms engage jamb end regions of the shoe platforms.

68. The system of claim 67 wherein counterbalance lifts are applied to the shoes above the jamb end regions of the platforms.

69. The system of claim 67 wherein the sash support arms are braced against movement beyond the downwardly dependent positions and the outwardly extending positions.

70. The system of claim 67 wherein the sash support arms are cut from metal extrusions.

71. The system of claim 70 wherein the extrusions are made in different lengths to accommodate the sash to different window dimensions.

72. The system of claim 71 wherein the extrusions are formed with coding lines to indicate the length of the sash support arms.

73. The system of claim 67 wherein the shoes are cut from metal extrusions.

74. A counterbalance system for a laterally removable sash supported by counterbalanced sash shoes respectively running vertically in opposed jambs arranged along opposite stiles of the sash, the counterbalance system comprising:

- 15 a. movable support arms extending between the sash and sash shoes biased upward at lifting regions spaced from each sash stile, the support arms being arranged for transferring the weight of the sash to the shoes at support regions vertically below the lifting regions; and
- 20 b. the support arms being movable to allow lateral movement of the sash between the lifting regions for withdrawal from the jambs when the weight of the sash is lifted from the shoes.

75. The system of claim 74 wherein the support arms are pivotally movable and are braced in a support position to block pivoting movement when the support arms are transferring the weight of the sash to the support regions of the shoes.

76. The system of claim 74 wherein the shoes are cut from metal extrusions.

77. The system of claim 74 wherein the sash support arms are cut from metal extrusions.

78. The system of claim 77 wherein the extrusions are made in different lengths to accommodate the sash to different window dimensions.

79. The system of claim 74 wherein the support arms are  
5 pivotally mounted on the sash stiles.

80. A support system for a sash that runs vertically within an opposed pair of window jambs containing counterbalance sash shoes, the sash being movable laterally of the jambs for withdrawing the sash from between the jambs, and the support  
10 system comprising:

- a. a pair of movable support arms engaging the sash and the counterbalance shoes and arranged for transferring the weight of the sash to support regions of the counterbalance shoes;
- 15 b. the support arms being movable to allow lateral movement of the sash when the sash is lifted to remove its weight from the support regions; and
- c. the counterbalance shoes being biased upward at lifting regions arranged vertically above the support regions.

20 81. The system of claim 80 wherein the support arms are braced against movement when the support arms transfer the sash weight to the support regions.

82. The system of claim 80 wherein the shoes are cut from metal extrusions.

25 83. The system of claim 80 wherein the sash support arms are cut from metal extrusions.

84. The system of claim 83 wherein the extrusions are made in different lengths to bridge different distances between stiles of the sash and the support regions.

30 85. The system of claim 80 wherein the support arms are pivotally movable on opposite stiles of the sash.

86. A support system for a sash that is laterally removable from between opposed window jambs, the support system including counterbalance shoes arranged within the jambs to be spaced laterally from stile edges of the sash to allow lateral movement of the sash for removing the sash from between the jambs, and the support system comprising:

- a. sash support arms arranged for bridging distances between the shoes and stiles of the sash, the support arms being movable between sash supporting positions in which the support arms transfer weight of the sash to the shoes and sash uplifted positions in which the support arms allow lateral movement of the sash;
- b. counterbalance lifting regions for the shoes being arranged vertically above support regions that uphold the weight of the sash transferred via the support arms to the shoes; and
- c. the sash support arms in the support positions being braced against moving in response to sash weight.

87. The system of claim 86 wherein the shoes are cut from metal extrusions.

88. The system of claim 86 wherein the sash support arms are cut from metal extrusions.

89. The system of claim 88 wherein the extrusions are made in different lengths to bridge different distances between stiles of the sash and the support regions.

90. The system of claim 86 wherein the support arms are pivotally movable on opposite stiles of the sash.

## SUPPORT SYSTEM FOR LATERALLY REMOVABLE SASH

### Abstract

- A support system for a heavy sash that is laterally removable from between opposed window jambs includes a pair of sash support arms pivotally mounted on each sash stile and counterbalance shoes that engage the support arms to uphold the sash. The support arms, in inwardly dependent positions, can engage the shoes as a sash is lowered onto the shoes; and the support arms, in outwardly extending positions, support the weight of the sash on the shoes.
- 5 Hooks dependent from the shoes can lock the shoes to the jambs during sash removal or replacement; and the sash support arms, the shoes, and the hooks are all preferably cut from metal extrusions.
- 10

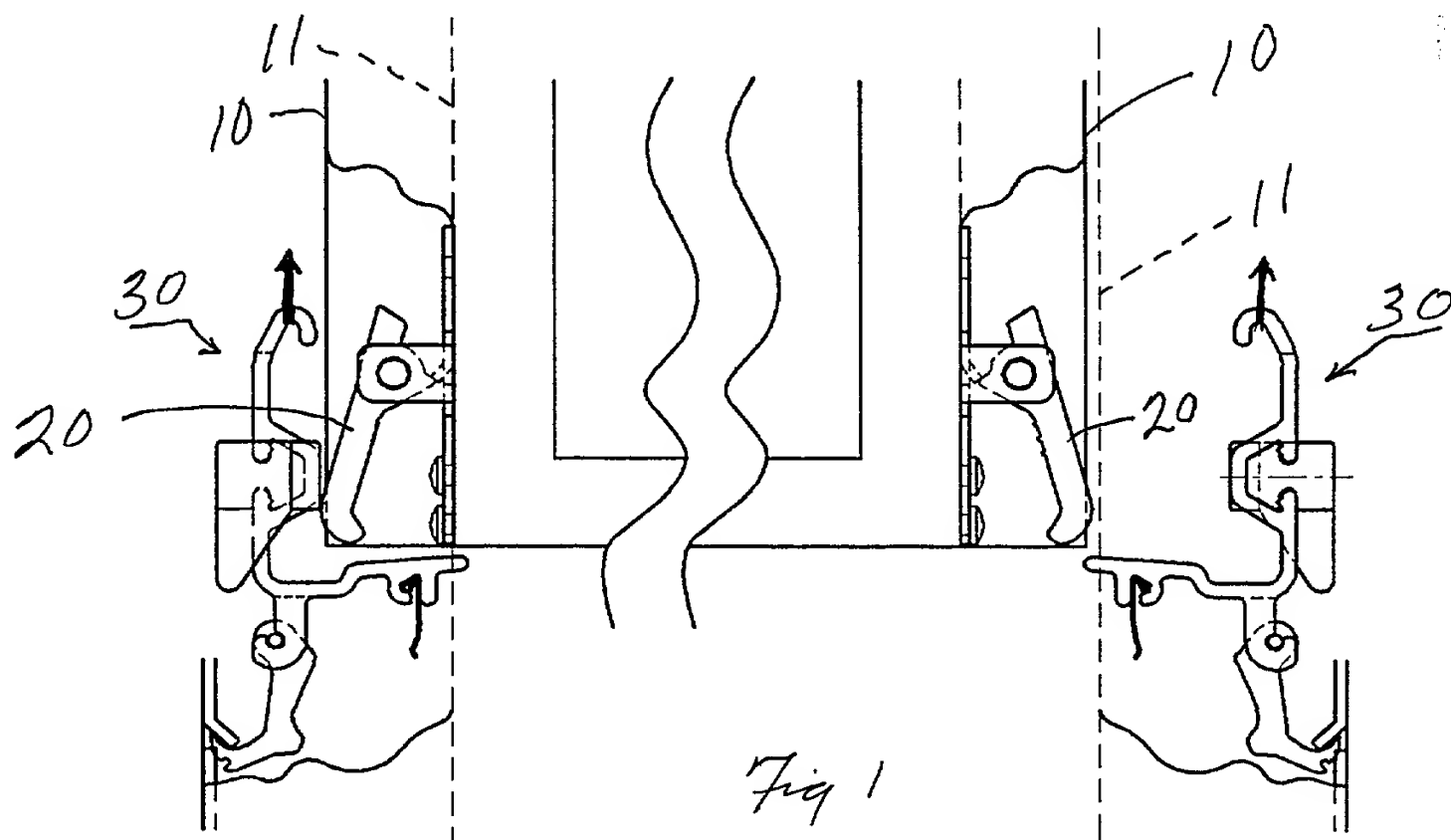


Fig 1

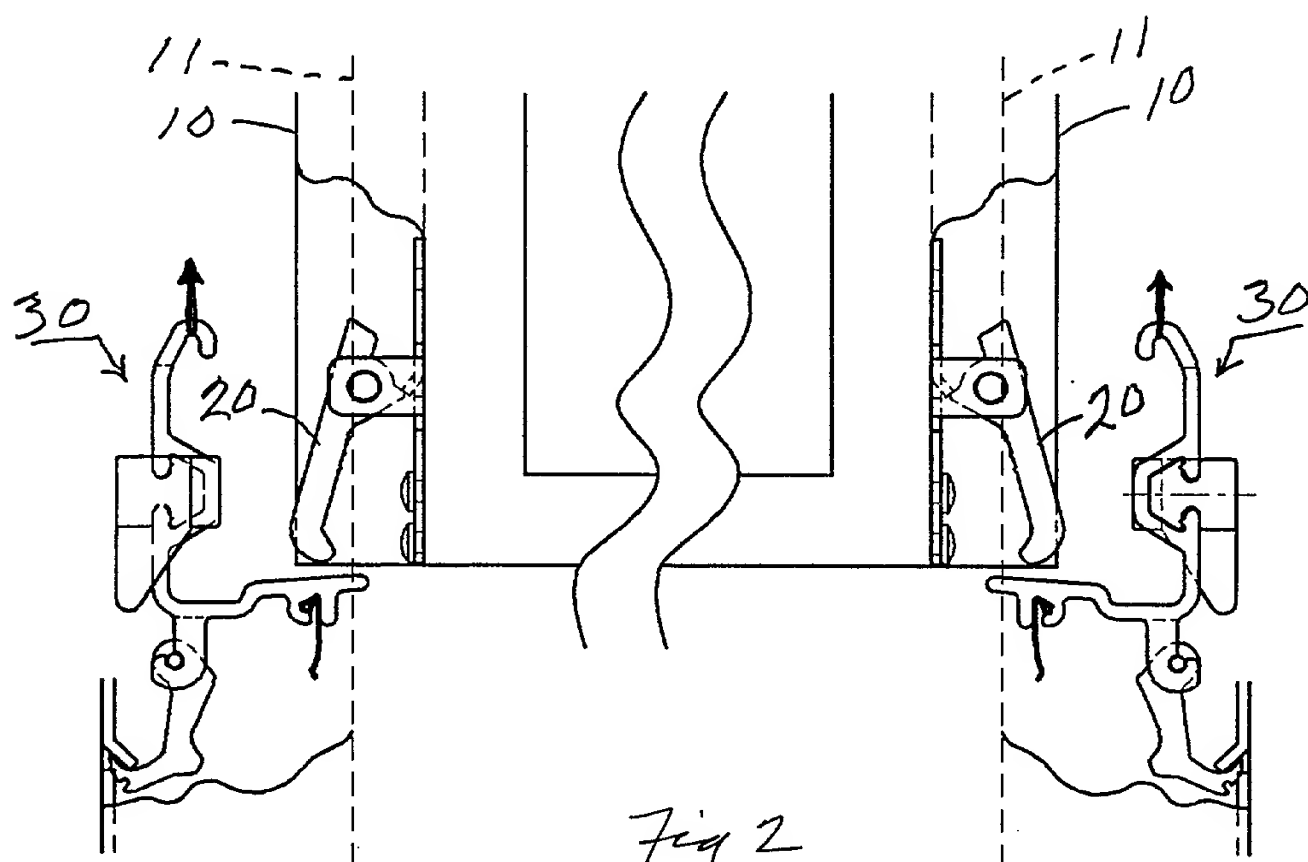


Fig 2

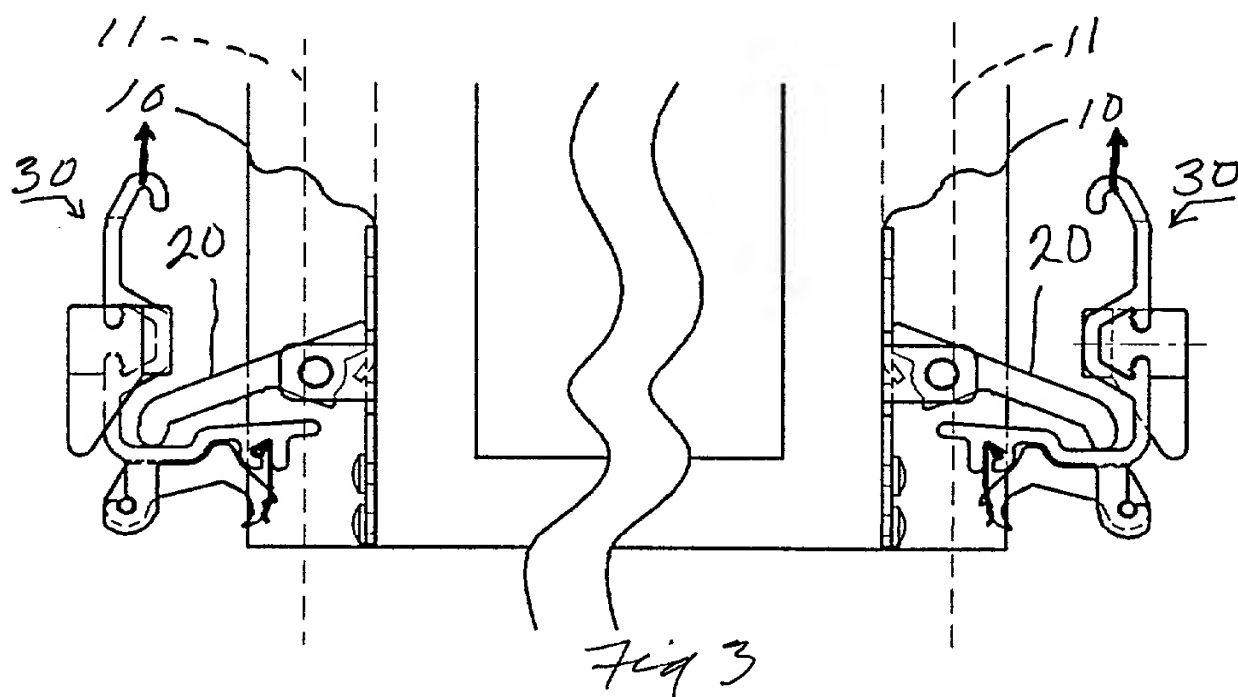


Fig 3

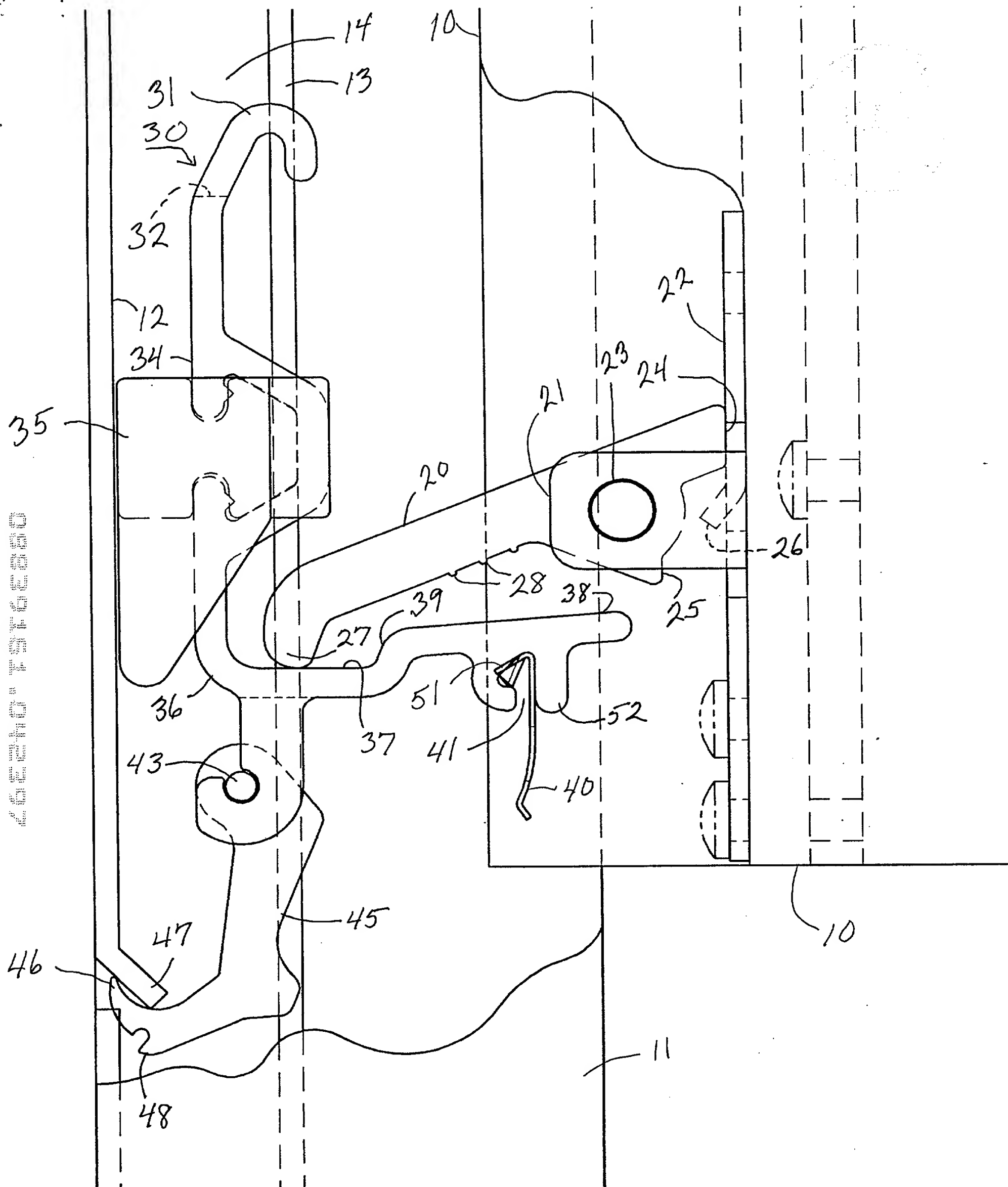
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Fig 4

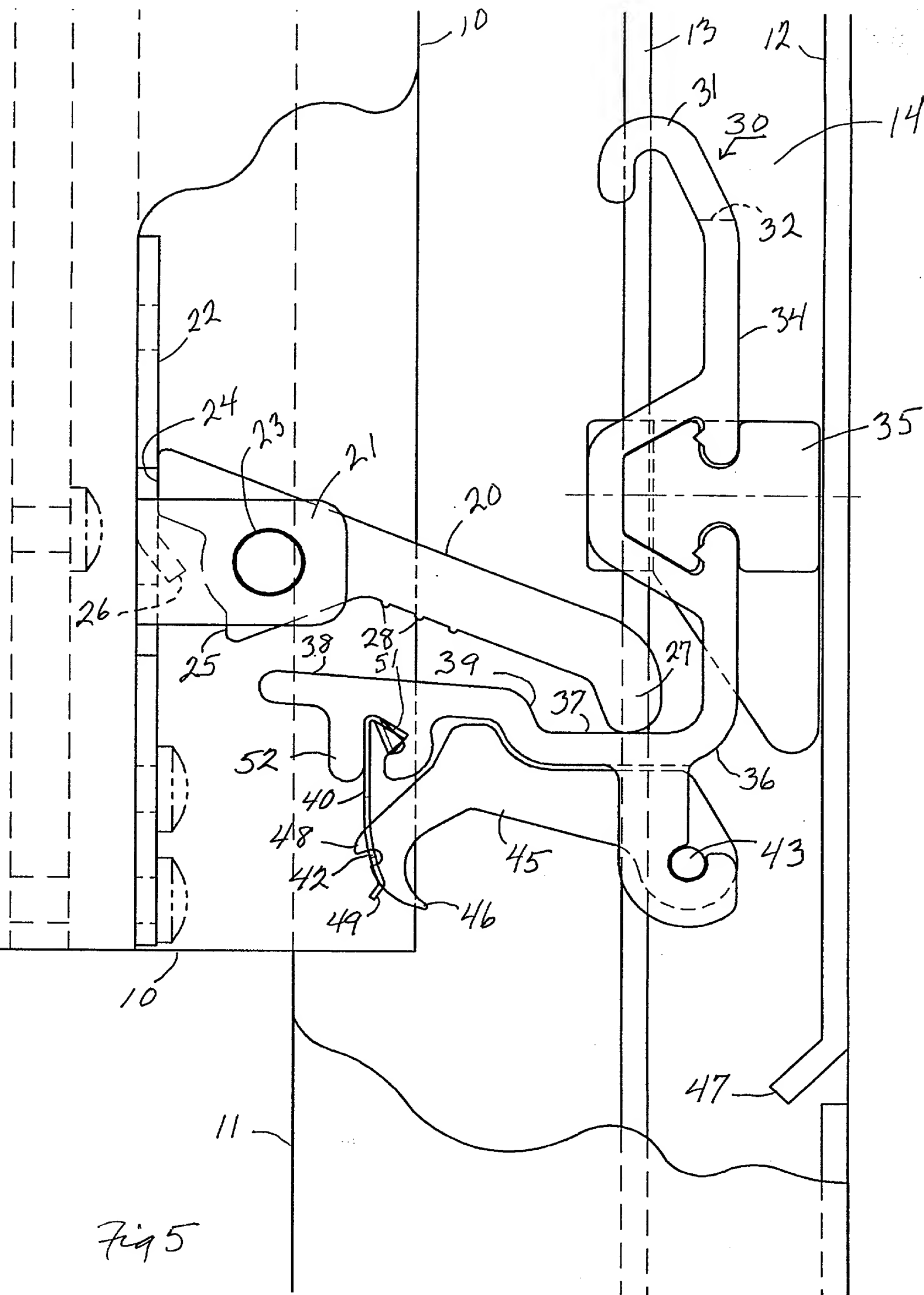
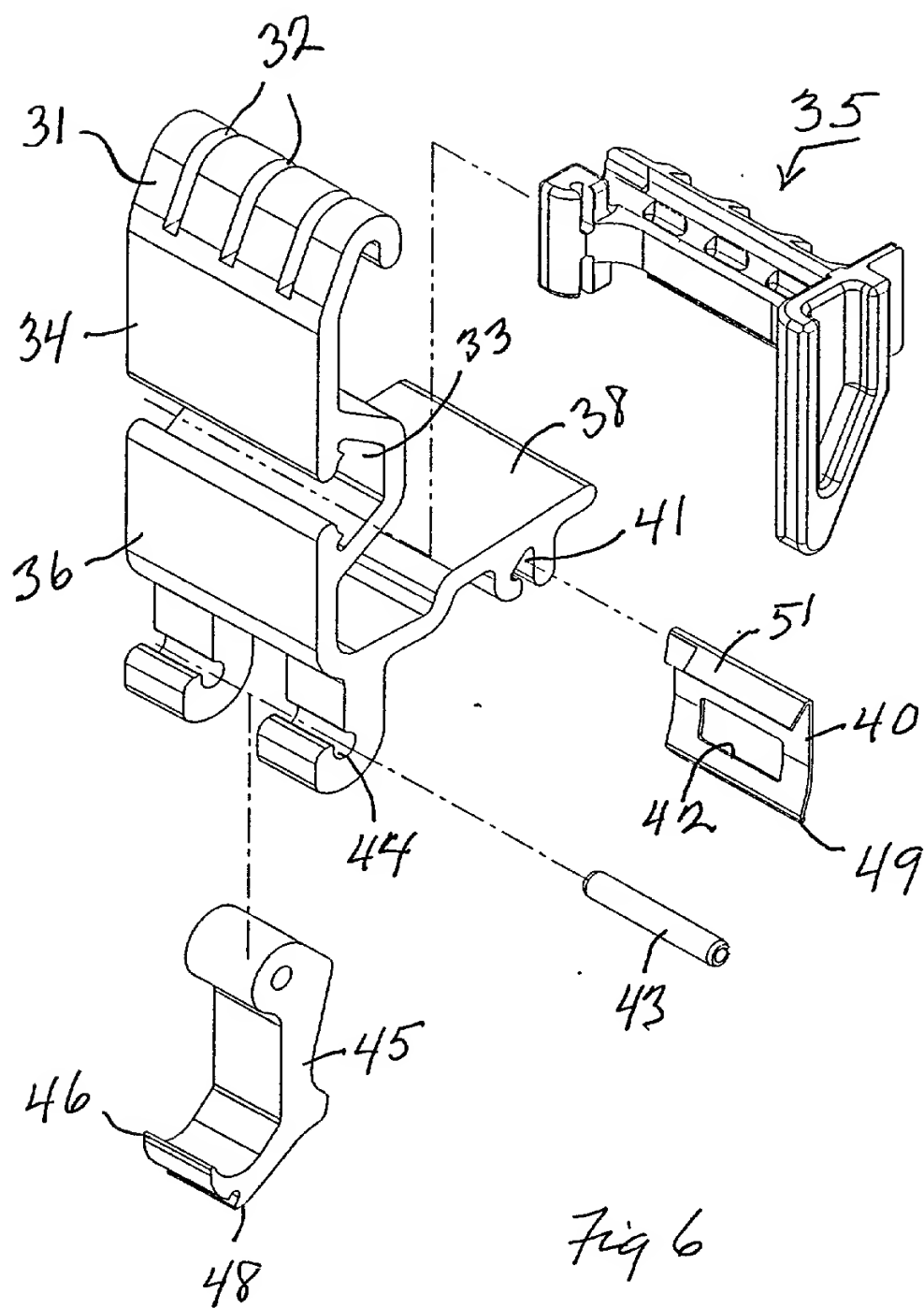


Fig 5





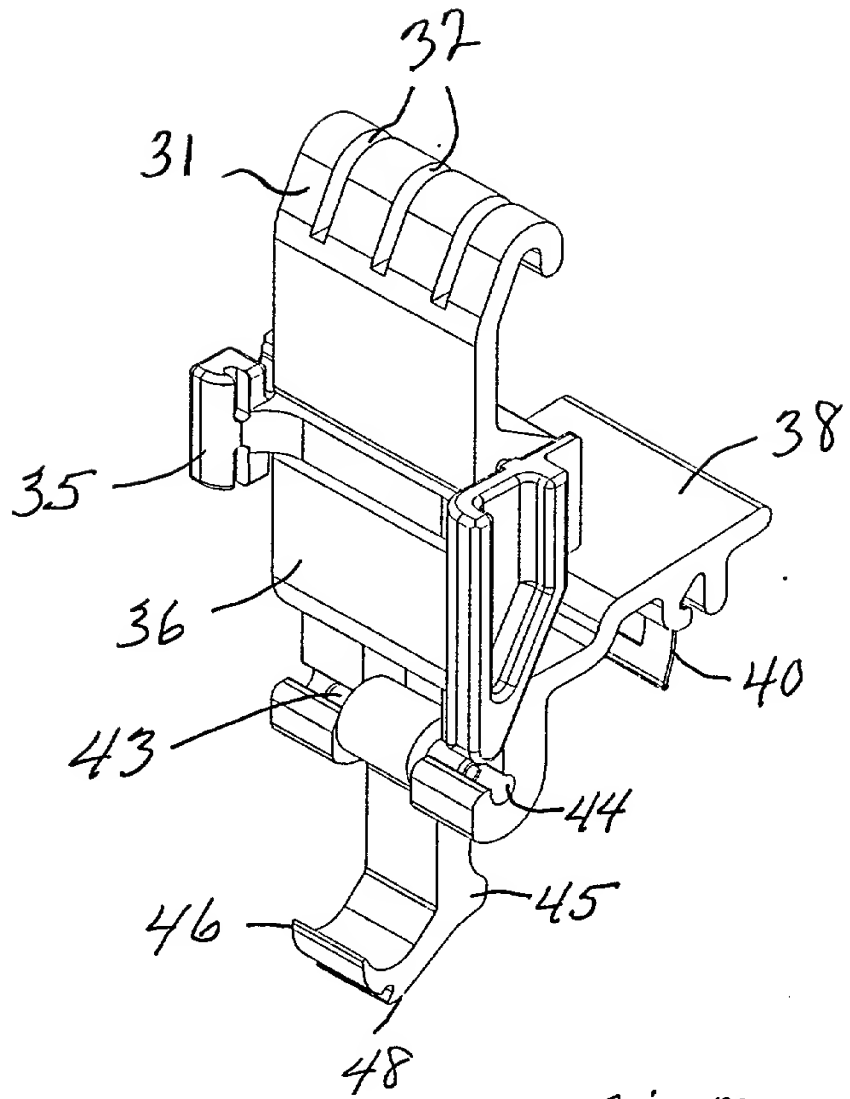
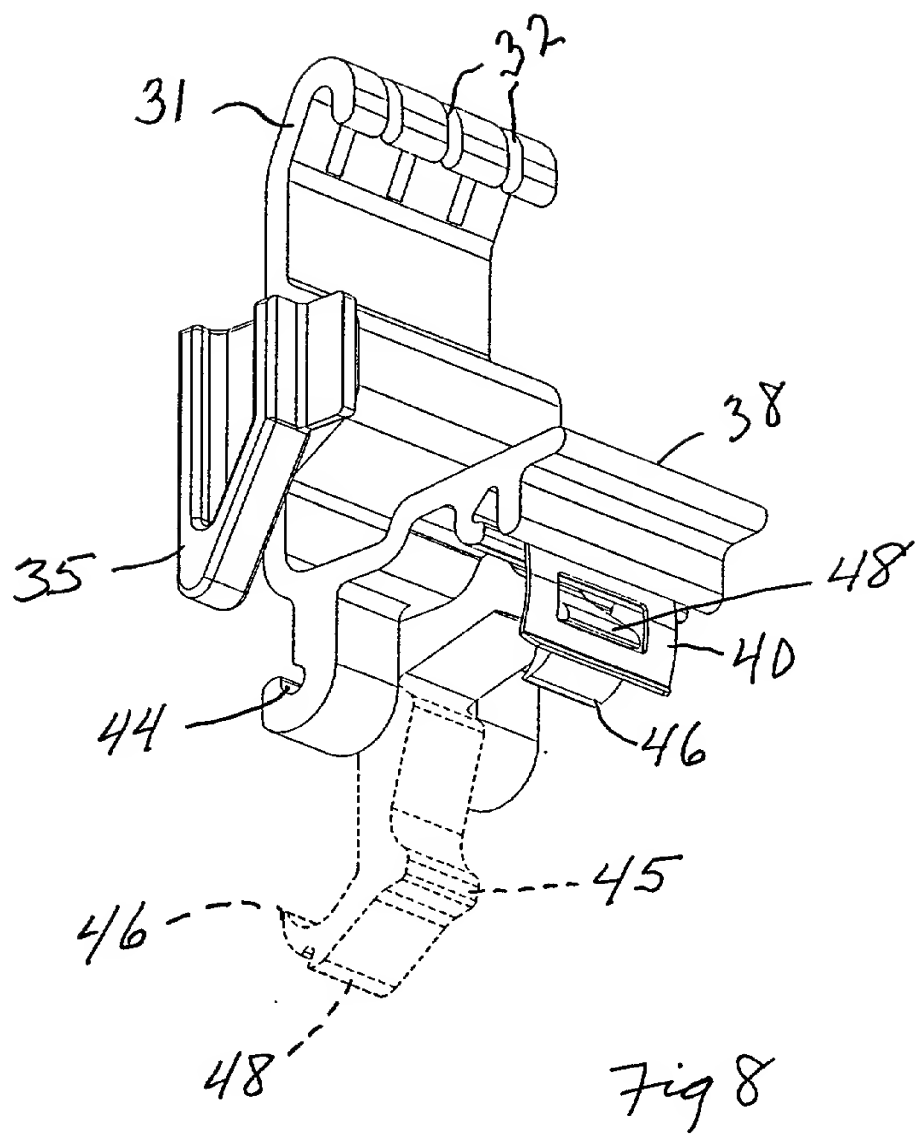


Fig 7



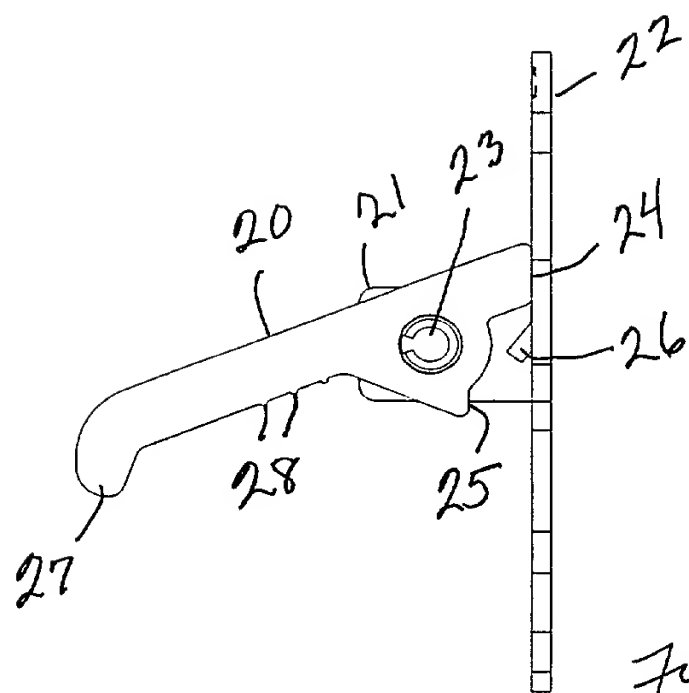


Fig 9

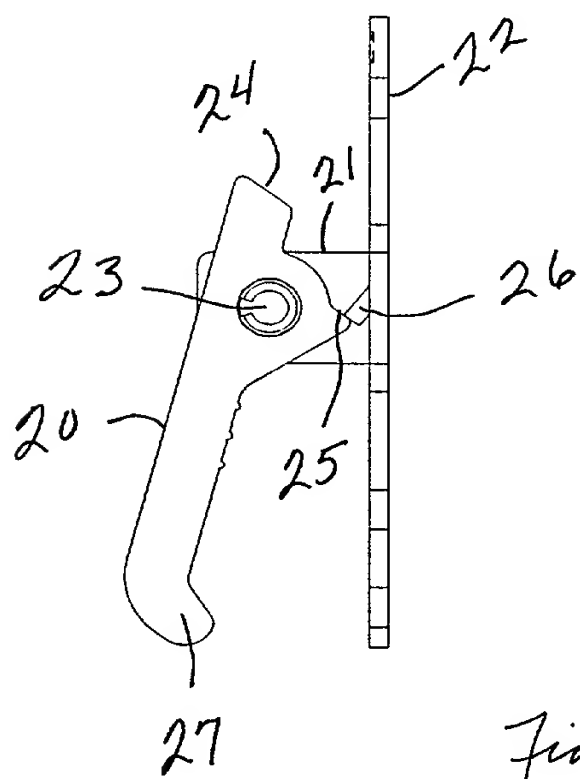


Fig 10

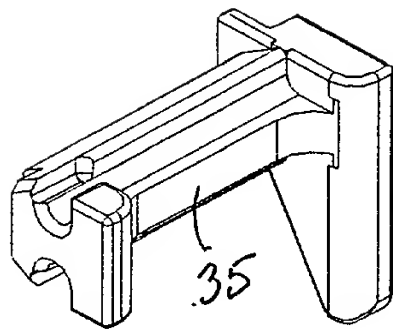


Fig 11

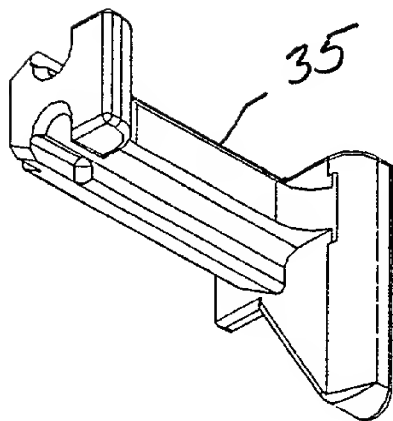


Fig 12

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**DECLARATION FOR PATENT APPLICATION**

Docket Number (Optional)

- As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled SUPPORT SYSTEM FOR Laterally Removable SASH, the specification of which

is attached hereto unless the following box is checked:

☐ was filed on \_\_\_\_\_ as United States Application Number or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

- I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	<input type="checkbox"/>
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	<input type="checkbox"/>

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112,

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

_____ (Application Number)	_____ (Filing Date)	_____ (Status -- patented, pending, abandoned)
_____ (Application Number)	_____ (Filing Date)	_____ (Status -- patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Address all telephone calls to \_\_\_\_\_ at telephone number \_\_\_\_\_  
Address all correspondence to \_\_\_\_\_

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's signature [Signature] Date 4-17-97  
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Second inventor's signature [Signature] Date 4-17-97  
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Post Office Address 3248 Winton Road South, Apt. K34, Rochester, New York, 14623

☐ Additional inventors are being named on separately numbered sheets attached hereto.

**DECLARATION FOR PATENT APPLICATION**

Docket Number (Optional)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

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Prior Foreign Application(s)

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Full name of second joint inventor, if any (given name, family name) \_\_\_\_\_  
 Second Inventor's signature \_\_\_\_\_ Date \_\_\_\_\_  
 Residence \_\_\_\_\_ Citizenship \_\_\_\_\_  
 Post Office Address \_\_\_\_\_

☐ Additional inventors are being named on separately numbered sheets attached hereto.